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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/798,720	03/11/2004	Ulrich Krumbein	1890-0064	5005

7590 11/29/2005

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EXAMINER

PARKER, JOHN M

ART UNIT	PAPER NUMBER
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2823

DATE MAILED: 11/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/798,720	KRUMBEIN ET AL.	
	Examiner	Art Unit	
	John M. Parker	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 August 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-34 is/are pending in the application.
- 4a) Of the above claim(s) 20-22 and 24 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 23 and 25-34 is/are allowed.
- 6) ☒ Claim(s) 12-16, 18 and 19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Applicants amendment dated 22 August 2005 in which claims 23,25,30 and 31 are amended, claims 20-22 and 24 are canceled and claims 32-24 are added has been entered.

Claim Rejections - 35 USC § 112

Previous rejections to claims based on 35 USC §112 are withdrawn.

2. Claim 15 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 15, it is unclear what the phrase "the area comprises a plurality of parallel columns extending in a direction substantially perpendicular to the surface of the substrate" is referring to, the columns in the area could comprise N type material, P material or isolation material.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 12-16, 18 and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Hossain et al. (US Pat. Pub. 2002/0137292).

Regarding claim 12, Fig. 2 of Hossian discloses a field effect transistor comprising:

a substrate having a doping of a first conductivity type [101];

a drain area in the substrate having a doping of a second conductivity type opposite to the first conductivity type [106];

a source area in the substrate being laterally spaced from the drain area and having a doping of the second conductivity type [104];

a channel area in the substrate disposed between the source area and the drain area [115]; and

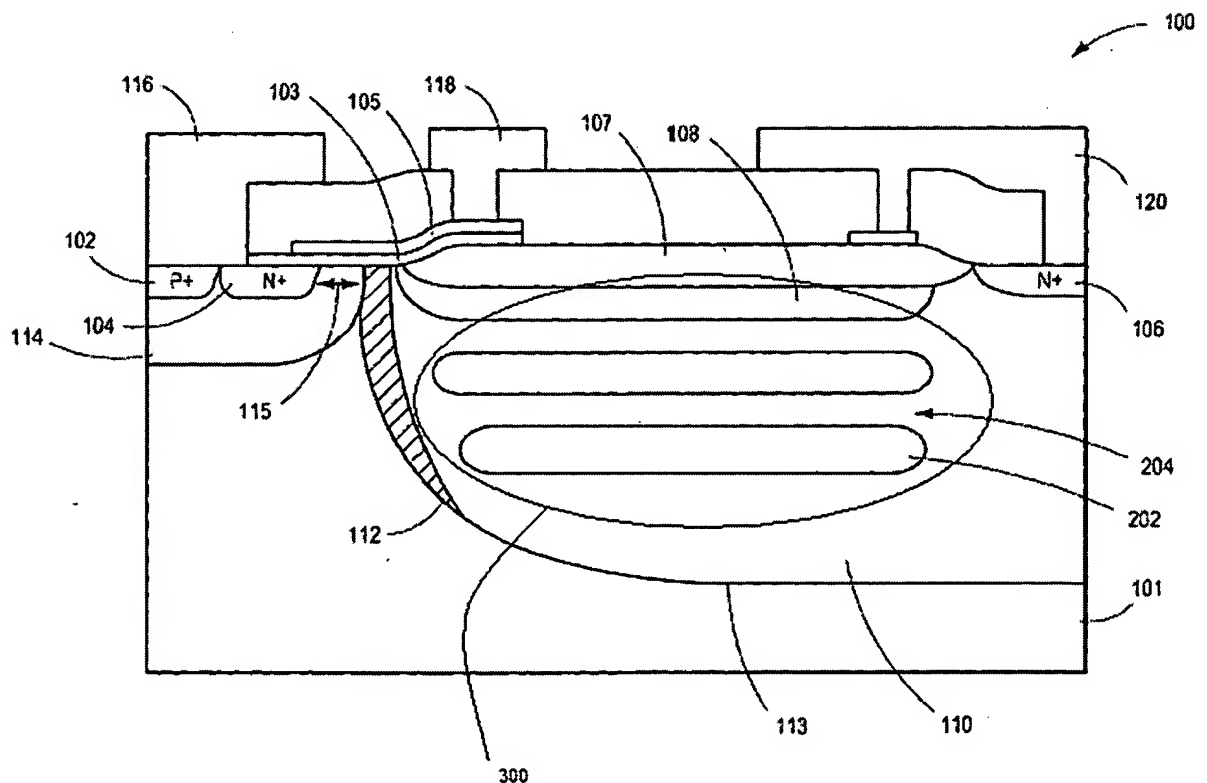


FIG. 2

an area having a doping of the second conductivity type [300], the area

connected to the drain area and arranged in a portion of the substrate adjacent to the drain area such that alternating regions having the first conductivity type [202] and having the second conductivity type [between 202 regions] are disposed in the portion.

Regarding claim 13, Hossain teaches the field effect transistor of claim 12, wherein the area is configured such that the portion of the substrate bordering the drain area is substantially depleted responsive to the application of a predetermined drain voltage [it is inherent when voltage is applied to an n doped area the p areas connected to it deplete the surrounding area]

Regarding claim 14, Fig. 2 of Hossain discloses the field effect transistor of claim 12, wherein the area [300] comprises a comb-shaped cross section.

Regarding claim 15, Fig. 2 of Hossain teaches the field effect transistor of claim 12, wherein the substrate comprises a surface at which the source area [104], the channel area [115], and the drain area [106] are arranged, and wherein the area comprises a plurality of parallel columns extended in a direction substantially perpendicular to the surface of the substrate [in so far as is understood, fig. 2 shows parallel columns of p and n type material comprising the regions of 202 and 204. Each parallel column (202 and 204) made up of its own parallel columns of p and n type material that are perpendicular to the surface].

Regarding claim 16, Fig. 2 of Hossain discloses the field effect transistor of claim 12, wherein the substrate comprises a surface at which the source area [104], the channel area [115], and the drain area [106] are disposed, the drain area including a first side disposed near the surface and an opposing second side disposed within the

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substrate, and wherein the area [300] is disposed adjacent the second side of the drain area [a portion of 300 is below 106 placing it adjacent to the second side].

Regarding claim 18, Fig. 2 of Hossain teaches the field effect transistor of claim 12, wherein the drain area includes a low-doped drain sub-area [110 and 112] having a plurality of drain portions in which a doping concentration in a direction toward the channel area decreases [the area around 300, inside 113, is all n type and connected with the actual drain contact 106, the doping of 110 is less than 106 and 112 is less than 110].

Regarding claim 19, Fig. 2 of Hossain discloses the field effect transistor of claim 18, wherein a lateral dimension of the area is at least as great as a lateral dimension of a most highly doped portion of the plurality of drain portions [300 is wider than 106].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hossain et al. (US Pat. Pub. 2002/0137292) in view of Peyre-Lavigne et al. (US Pat. Pub. 2004/0222461).

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Regarding claim 17, Houssain fails to teach the entire field effect transistor formed in a epitaxial layer formed on the substrate. However, Peyre-Lavigne teaches a LDMOS formed in an epitaxial layer [Fig. 6, 12].

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the teachings of Peyre-Lavigne into the device of Houssain by growing an epitaxial layer grown on a substrate, forming the source area, drain area and channel area therein as well as having the portion in which the area is arranged extending from the drain towards the surface of the substrate. The ordinary artisan would have been motivated to modify Houssain in the manner set forth above for at least the purpose of using an art recognized equivalent [forming a device in a epitaxial layer is essentially the same as forming it in a substrate, also see *Smith v. Hayashi*, 209 USPQ 754 (Bd. of Pat. Inter. 1980)].

Allowable Subject Matter

Previous subject matter that was indicated as allowable is withdrawn

5. Claims 23 and 25-34 are now indicated as allowable

The following is a statement of reasons for the indication of allowable subject matter:

Regarding the independent claims 23 and 32, the prior art fails to teach a plurality of regions of a second conductivity type extending from the drain area into a substrate of the first conductivity type.

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additional cited art contains similar structures to those instantly claimed.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John M. Parker whose telephone number is 571-272-8794. The examiner can normally be reached on Monday - Friday 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on 571-272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JMP


GEORGE ECKERT
PRIMARY EXAMINER